radius of the earth at the place for which we are computing, *l* its geocentric latitude, and L the east longitude from Greenwich; the quantities within square brackets are logarithms.

At the Royal Observatory the first external contact is found to occur at 3h. 11m. 35s; the sun will set at 7h. 31m., about 30m. after least distance of centres, so that more than half the transit may be observed. At Edinburgh the first contact takes place at 2h. 58m. 53s. Edinburgh mean time, and the sun will set at 7h. 36m. The first *internal* contact at Greenwich and Edinburgh occurs 3m. 7s. later. The angle from North point of external contact is 45° towards East for direct image.

At Ogden, Utah, to which position it has been stated that a French Expedition is proceeding for the observation of the phenomenon, Mercury enters upon the sun's disc at 7h. 44m. A.M., and the egress takes place at 3h. 18m. P.M., the duration of the transit being 7h. 34m.

At the next transit at the descending node on May 10, 1891, the last external contact at Greenwich, according to Leverrier's tables, will occur at 4h. 50·4m. A.M., and as the sun will not rise till 4h. 19m., but little of the transit can be witnessed in this country. In the transit at the opposite node on November 10, 1894, the first contact of limbs appears to fall close upon sunset here. On November 7, 1881, as will be seen from the *Nautical Almanac*, the transit will be wholly invisible in England. It thus follows that on the afternoon of May 6 next, we shall have in these islands the only favourable opportunity of viewing the planet Mercury projected upon the sun's disc that is afforded during the present century.

GEOGRAPHICAL NOTES

AFRICA.—M. F. Deloncle, a member of the Geographical Society of Lyons, has recently translated into French a remarkably interesting itinerary of the voyages made by a Spanish friar in the middle of the fourteenth century. The work was originally written in the Catalonian dialect and devoted chiefly to travels in Africa.

The Society of Geography has prepared, for the Paris Exhibition, a map of Africa, measuring 2 m. × 2 metres, and showing the route of every explorer from 1754 to Stanley, in 1878. The number of travellers is 121, of whom not less than 42 are French; but a large number of these explored either Madagascar or the Desert round Algeria. The first name written in this list is Mayeur, a traveller now quite forgotten, who crossed the northern part of Madagascar.

NEW MEXICO.—During the season of 1877 a party of the U.S. Geographical and Geological Survey of the Territories, under the command of Lieut. C. C. Morrison, was detailed to survey the section of New Mexico lying between the 105th and 108th meridians and between the 33rd and 35th parallels, about half of which is mountainous, the rest being mesas and plains. In giving an account of their explorations at the last meeting of the Royal Geographical Society, Mr. T. W. Goad, the meteorologist of the party, mentioned some points in regard to the physical features and characteristics of the country surveyed, which attracted special notice. Between the Sierra Blanca and the Oscura Mountains a lava flow was met with of over seventy-five miles in length, with an average breadth of three miles. This Mal País, as the Mexicans call it, resembles a black river, widening and narrowing as the country undulates. This stretch of lava, owing to denudation, is somewhat higher than the surrounding country, and is full of caverns. Several of these were visited by the survey party, but the only one of importance was near Fort Stanton, which, like the others, was in a limestone formation, and proved of considerable length; some persons, indeed, asserted that no one had been to the end, though a distance of five miles was measured. The exploration of this cave was of a most uncomfortable nature, necessitating long crawls through narrow passages, and obliging the explorers to wade up to their waists in ice-cold water for hours. Stalactites and stalagmites of immense size were met with. The lake in the cave was said to contain eyeless fish, but none of the party were able to catch or see any. The cañon, again, of the Rio Grande, below Castilla, is of peculiar interest, because it differs in most respects from other cañons, and instead of being worn away by the action of the water alone, it was probably commenced by volcanic action. The sides are of trap-rock, and although the cañon itself is very narrow, its depth was estimated at 1,000 feet. The river at this point has a great fall and rushes along with a velocity of ten miles an hour. Mr. Goad describes the climate of New Mexico as delightful.

GEOGRAPHICAL ANNUAL.—The new volume of *L'Année Géographique*, for 1876, has at length appeared. The delay has been caused by the resignation of the editorship by M. Vivien de St. Martin, whose time is now so fully occupied with other work. The new editors are MM. Maunoir and Duveyrier, and the new volume is quite up to its predecessors. The volume for 1877 will be published about June.

METEOROLOGICAL NOTES

METEOROLOGY OF STONYHURST.—The results of the meteorological and magnetical observations at Stonyhurst for 1877 are already published. In addition to the very full statement of the results for the year, and which are compared with the averages of previous years brought down to date, there are given observations of crops, flowers, trees, and shrubs; observations of the cirrus clouds made at the observatory in connection with Prof. Hildebrandsson's large inquiry into the upper movements of the atmosphere; and a discussion of the hours of occurrence of the barometric maxima and minima during the eight years ending 1875. This discussion has been evidently conducted with great care and with full knowledge of the subject in hand. The results arrived at are of great importance, the chief points being that there is a tendency of the maxima to occur between 10 and 11 A.M. and P.M., the total number from midnight to noon being, however, considerably in excess of that from noon to midnight; and that the minima occur with nearly the same regularity as the maxima, but at different hours, viz., about 3 and 4 A.M. and P.M. The importance of these results lies chiefly in the circumstance that they accord with the hours of the critical phases of the diurnal fluctuations of the barometer, and peculiarly so as regards the annual results. We are much pleased to see from the report that Father Perry is engaged with the discussion of the meteorological observations made at Kerguelen during the Transit of Venus Expedition, to the results of which meteorologists will eagerly look forward.

WEEKLY STATISTICS OF THE WEATHER.—The Meteorological Office has begun to issue weekly statistics of the weather of the British Islands for agricultural and sanitary purposes. For this object the country is divided into two divisions, the one being suited for the production of wheat, and the other for the rearing of stock. For each of the ten regions into which these two divisions are sub-divided there are published the highest, the lowest, and the mean temperature of the week, and the degree to which the last is above or below the average of the week, together with the number of days of rainfall, its amount, and the difference between the latter and the average rainfall of the week. To these follow general remarks on the weather as regards frost, winds, storms, and any irregularity that may have occurred in the rainfall at the selected stations. This step is in the right direction, and the scheme will no doubt soon receive greater extension and further development in order that

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it may the fuller meet the requirements of the classes for which it is intended. It is desirable, for instance, if not indeed essential, that the mean temperature be given to tenths of a degree and not merely to whole degrees, particularly when it is kept in view that no inconsiderable portion of Great Britain is but little removed from the limits of the successful cultivation of the wheat, and the rainfall to hundredths of an inch, so as to mark off clearly the practically rainless districts during each week. The number of stations situated on the coast preponderates too largely. Additional stations from several of the great agricultural centres are needed, and a partition of the country into more districts than ten, it being evident that a division of Scotland merely into east and west, and of Ireland into north and south, is inadequate. Scotland, for instance, should be divided at least into north-east, north-west, south-east, and south-west divisions, these differing essentially from each other in their climatic and agricultural peculiarities.

MISSOURI WEATHER REPORTS, NOS. 1, 2, AND 3.—The system of weather service for the State of Missouri is being satisfactorily and energetically developed by Prof. Francis E. Nipher, Washington University, St. Louis. The second report, being for January last, is accompanied with a table showing the rainfall at thirty-eight stations in Missouri and a map on which the amounts are entered and isohyetal lines drawn showing where the fall was nothing, one inch, two inches, and three inches respectively. From this map the distribution of the rainfall, a correct knowledge of which is so important to farmers and others, is seen at a glance. The distribution of the heavy snowfall of the 30th and 31st is particularly detailed, and we are pleased to see the frankness with which Prof. Nipher informs his observers that it has been impossible to give a proper account of the remarkable storm of the 26th, which entered the northern part of the state at 8 A.M. and soon thereafter developed into a severe thunderstorm in central and southern Missouri, owing to the times of the beginning and ending of the storm not being given carefully for a sufficient number of places. We feel assured that the observers will gladly see to the rectification of this and supply the information desiderated in future. From the first report we see that the mean temperature of December was 12°·4 above the average of the month; and with this high temperature, the mean of the month being 45°·6, vegetable and animal life was prematurely urged forward at an undesirably rapid rate. A valuable table accompanies this number, which has been prepared by Dr. Engelmann, giving the mean monthly temperatures and extremes and the mean rainfall at St. Louis for forty-two years, from which it appears that the mean of the coldest month, January, is 31°·7; the warmest month, July, 79°·2, and of the year, 55°·4. The highest temperature noted during these forty-two years was 104°·0 in July, 1860, and the lowest—23°·0 (below zero) in January, 1873. The mean annual rainfall is 42·46 inches, the largest monthly fall being 5·39 inches in June, and the least, 2·13 inches in January.

EXTRAORDINARY RAIN-STORM IN CANADA.—A continuous storm of rain, extending over two or three days, and covering a considerable portion of North America, occurred in the end of February, the weather for some time before having been unusually mild. Near the coast rain prevailed, in the Quebec district much snow fell, about Ottawa, sleet, hail, rain, and snow fell in succession, and on advancing westwards through Canada, and into the United States, the precipitation appears to have been heavier. In Central Canada the floods seem to have been most destructive, and immense damage has been done to the towns built on the rivers, by the loosening of the ice by the floods, which, floating down the swollen rivers, carried bridges and other structures before it. Much damage was also done by the ice running aground at various points, and thereby damming up the rivers, by which extensive stretches of low-lying grounds were submerged.

COMPARATIVE ATMOSPHERIC PRESSURE OF NEW ZEALAND AND GREAT BRITAIN.—Mr. C. Rous Marten, whose name has been so long and so favourably associated with the meteorology of New Zealand, has published a short paper on this subject in the *Transactions* of the Wellington Philosophical Society. The mean pressure of the atmosphere of Great Britain calculated from fourteen stations distributed from the Channel to the Moray Frith, is 29·848 inches; and of New Zealand, as similarly determined from fourteen stations from Southland to Mongonui, 29·918 inches. The interest of the comparison lies in this, that pressure diminishes in both countries at a somewhat rapid rate on proceeding into higher latitudes, and that though the New Zealand stations lie on the average in about 12° lower latitudes than British stations, yet the pressure does not greatly differ in the two countries. The strong resemblances between the climatologies of the two countries result from the peculiar distribution of pressure common to both and the lie of their mountain ranges, by which the prevailing winds are westerly, and being laden with the vapour of the ocean they have traversed, are productive of rainy climates in the west, and dry climates in the east.

NOTES

INVITATIONS have recently been issued by the Rector of the University of Pavia to the various scientific societies of Europe, to participate in the ceremonies connected with the unveiling of the statue of Volta on April 28.

THE Electro-metallurgical Company of Brussels has lately completed a colossal statue of Jan van Eyck, in bronze, by the system of electric deposition. The galvanic process occupied several months, although a thickness of but six to eight millimetres was attained. It is probably the largest object which has been produced by this method, being over twelve feet in height, and is regarded as a much more perfect imitation of the model than could be obtained by casting.

THE meeting of the delegates of the French Sociétés Savantes will take place as usual at the Sorbonne, in the first week after Easter. M. Bardoux will preside over the meeting for the distribution of prizes, and deliver an address summarising all the measures contemplated by the Government for promoting popular instruction.

M. BARDOUX has given the decoration of the Legion of Honour to the oldest schoolmaster of France, who has been teaching since 1818 in the very parish where he was born. The ceremony took place at Clermont-Ferrand at a dinner given by the Prefect in honour of the Minister. The whole scene is said to have been very impressive.

M. ASSELINE, a journalist and a member of the Municipal Council of Paris, died suddenly a week ago. He was one of the Society of Mutual Autopsy recently established in Paris for investigating by *post mortem* examination all the circumstances of death, and his case was the first instance of the application of the rules of the Society. The autopsy was made by Dr. Broca, the president of the Society, and the results published in the papers.

THE Municipal Council of Paris has appointed a Commission of ten members in order to take part in the proceedings of the French Association for the Advancement of Science, which will take place at Paris, as we have already reported. They will sit in their official capacity.

A SOCIÉTÉ DE MINERALOGIE has been formed in Paris, with M. Des Cloiseaux as president. It meets on the second Tuesday of each month in the mineralogical laboratory of the Sorbonne.

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